An Essay

on

The Blood and Sanguification

Respectfully Submitted

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— By —

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To follow the thoughts of the wise and to gather them into a chain reflecting ones own ideas, is a never failing source of pleasure, and of subjects whose importance and interest have gained them the attention of men of all ages especially is this true. The Blood has ever been such a subject, and the discoveries of modern science have not tended to fade any of its ancient interest. With the idea of material existence is connected that of source, purpose and destiny, and it is probable that from an innate consciousness of these attributes of creation, man is led instinctively to inquire concerning them; and that from observation of the dependences of nature's works on eachother, all human knowledge originated.

What were the weary stages of discovery it is useless and almost impossible to state.

The lacteal and lymphatic vessels were each supposed, at different times, to be the sole medium through which the blood was kept at its standard, but the penetrating light of observation dissipated successively the ingeniously invented theories supporting these views, and established here the cycle to which nature and her

laws tend, These two systems, so called, should properly be considered as the same great chain of vessels, the lacteals being only a modification in origin required by the particular location and additional duties assigned them, simulating many other instances of modif. of structure in the organs. They act alike in supplying nutritious material to the blood; one situated in the intestine, selecting alimentary matters prepared by previous processes suited to its elaboration, the other exists in almost every tissue of the body and is believed to act in collecting, as it were, from the transudations continually taking place in all parts such material as is not completely prepared or required for the formation of tissue, or such as may subsequently aid in nutrition.

It was supposed the lymphatics acted only the part of an excreting organ, and so far as exhausted matter admits of being elaborated for secondary use it may be thus looked upon; for it is believed that such matter may be conducive to the nutrition of the body, yet the existence of matter wholly excrementitious in the fluid of these vessels, would very possibly hinder or prevent entirely the elaboration of other substances, and is therefore probably never allowed admission

Another aperature by which the blood may be augmented, one though not literally universal in its distribution, acts as is fully known in nourishing every part, and therefore has power to absorb from every part; to this, the capillary blood vessels, could very plausibly be attributed the function long thought to rest with the lymphatics; that of bearing off the wastes of the tissues. The blood is the medium of exit of these substances, and from a knowledge of the rapidity and directness of the excretion of useless matters, and from observation of the direct and immediate excretion of hurtful substances from the alimentary canal, we should infer, in view of the expediency of the evolution of such substances, that the capillary blood vessels act that part; they offering all the required conditions for the process. This could not offer here, such opposition, if any, to the elaborations in process in the blood, as the facilities offered here, for evolution, by the numerous excreting glands, would allow the fluid to rid itself of the hurtful matters; whereas in the lymphatics they must necessarily pass as inert, unchangeable matter, through the whole course to the veins. Of the important changes performed in the

lymphatics nothing is known but its results, they are vital and marked by the progress of the fluid. The Peyerian glandulae situated in the intestinal walls and thought to ha peculiarities of function and structure, are probably a part of the mesenteric glands; we have no clue to their funct as proper intestinal glands, they secrete no fluid known to aid in the digestive process, neither do we know that they have absorbent affinities for any substances in particular or fo these and the fact that they may be injected from the lacteals, we cannot place them in any other category.

As food and nutrition are so intimately related it is natural to look to the Chyle as the first prominent supp port of the blood especially so as it is the fluid in which the prominent constituents not only exist but may be said to originate. The Albumen and corpuscles which compre- hend the greatest part of the vitality of the blood here first exhibit themselves in vital attire. Albumen is ab= sorbed in the form of peptones and probably changed by that process and subsequent ones into the coagulable form, since it is materially increased by that passage, that is through the glands bordering on the intestines; in farther advance to

the thoracic duct a distinct decrease in free fat is observable while saponification is probably gradually accomplished since it is augmented in that form; this must be the effect of approximation to the blood in the glands. It is a question undecided whether fibrin originates in the lacteals or has its source in the serum of the blood; suffice it to say here, that its formation is probably more a vital than a Chemical process and it cannot therefore be at present denied origin here, simply on account of its Chemical constitution, that it is formed from albumen is fully believed and it should be remembered that the human organism is not to be estimated as a Chemical laboratory, where Chemical changes may mature under similar circumstances to those with which we are so well acquainted.

The fluid of the lymphatics whose source is clearly defined to be from the blood represents a second elaboration of substances introduced from another quarter; it may even be that there are certain portions of the blood whose whole nutritive properties are not obtained by a second or a third elaboration, and that a continual round of this vitalizing work is kept up, until every latent nutritive property is developed. Here in the lymphatics

is the seat of this development. In consonance with this view we cannot deem it impossible for the lymphatics to conta even comparatively large quantities of excrementitious matter, for while there remains a dormant nutritive element in any substance, that alone would gain it admission. The duties performed here are in a word of a concentrative character, the formation of blood cells from the plastic matter being probably an important one.

Arrived at the veins the blood has assumed many of its sensible and vital properties, though time and many changes intervene between this and the manifestation of all these, as we infer from the forgoing; different constituents differ widely in the manifestation of their various properties or offices, though they enter the current at the same time. An estimate of the quantities of lymph and chyle daily poured into the veins shows it equal in volume to the entire amount of blood, making it appearant, on first thought, tha the nutritive material exhausted daily is enormously large, but a subsequent part of the same estimate shows the portio introduced by the chyle or absolute fresh material to be only one fourth, or a little less, that of the lymph, which is

only a return of previously introduced matter. The first sensible property of blood by which it is recognized and indeed distinguished from all other fluids of the body, is Color, due entirely to the corpuscular elements, though it may be and is, modified by conditions of the fluid in which they float. We esteem the Corpuscles an important morphological element, and though the conspicuous position they occupy, has brought them under frequent and critical examination, their real function can not yet be precisely stated. There can be little doubt however that these cells are as truely vital as any in the body, placed here to perform vital acts, that they are nourished as living beings, have a definite period of life and a stage of decline. Their origin is undoubtedly principally from the chyle being probably formed from the minute clots found in that fluid. these constitute the cell walls and are albuminous in character. With regard to function many theories are advanced explanatory to duties which it is uncertain whether they take part in or not, but thus much is undoubtedly true of them, that they act both in renovating the tissues and bearing off noxious gases; though this duty is neither mechanical chemical nor vital alone but a combination of the two former.

From the primitive contents of the cell, are probably formed those two remarkable constituents Hematin and Globulin; fro Chemical analogy there have been theories advanced for the origin of these substances, the former being considered as a conversion of fat, which exists primarily within the albumin wall as a nucleus, the latter as an oxydation of albumen intermediate between the substance itself, and fibrin. These cells in all probability have an action similar, and bear somewhat of a similar relation to the liquor Sanguinis, that the glands do to the lymphatics; that is to elaborate certain materials of the Serum and prepare them for vital activity. Additional obscurity rests around the Colorless cells and as great a variety of opinion exists as to their origin and destiny, they both originate as far as known in the Chyle and preserve a distinct anatomical form, which controverts the view that they completed development by attaining the stage of the red corpuscle; they too, we must assume, have a proper office which is adapted only to them, and one simulating in character that of the red globule. The anatomical difference must be one of developme a different germ and constitution. The idea of their

functions having a relation to external tissues, because of their occupying the superficial part of the current, and their frequent adhesion to the walls of the vessels, has no definite ground of support. this phenomenon is more probably owing to conditions existing within the vessels; as relations to the serum and to the red corpuscles.

That the blood globules undergo disintegration at a definite spot in the organism, was an assumption to which great credence was given, and it still receives support; but the forgoing view of the cells cannot harmonize with this doctrine; that a cell of this character should finish invariably its career in any particular spot would be incompatable with its vital purpose. That disintegration does take place in particular parts, as the spleen, proves nothing for its physiological function, as far as known, would render it important and necessary that disintegration should take place there at certain times; but that it, or any organ is the invariable seat of such disintegration cannot at present receive support.

Constituents of the blood with whose purposes we are more conversant are contained in the plasma of that

fluids of these albumen and fibrin are most prominent
the former which makes its appearance immediately after
absorption exists in the chyle and blood in the same form.
It is believed by high authority that it furnishes fibrin
simply by oxydation, this theory presupposes the origin of
fibrin to be confined to the blood and that existent in the
lacteals to be a consequence of absorption. It has ingenious
arguments in its support, yet great objections are manifest.
If oxydation of albumen to the fibrinous state had been
assumed to take place after transudation, then some
of the defects of this theory could be avoided: there is
manifestly a means for the engrossment of oxygen, one whose
affinities are greater than those of albumen, or there
would be a great increase of fibrin in the blood. If
therefore the albumen be deposited by transudation and
subsequently undergo organization, the smale quantity
of fibrin in the blood is accounted for, and its uses made
apparent as the means of retaining, by coagulation, the
transuded matter in place, while the gradual process
of its conversion is going on. Thus this question of the
retrograde state of fibrin is settled and the preponder-

ance of albumen over it understood. This small quantity may be the product of elaboration in the lacteals, oxydized to that state by a liberation of gas from other affinities. Small as this quantity is it cannot give any support to the belief that fibrin is a retrograde substance, for we know of many conditions requiring and many more which might require this small quantity, while an excess would not only be useless but hurtful. It is evidently one of the many provisions of nature for the security of her work, one of the most important being to cause immediate but partial organization in case of accidental lesion. How its solution is preserved is not known, there are evidently many conditions conducive to it, these being lost in the body, at times, even in health.

Other elements of the blood have been referred to the nutrition of those parts with whose chemical constitutions their own seemed most nearly to affiliate. The fatty matters which are found in the blood, exist principally in the Saponified form, Phosphorized fat existing as a component of the corpuscles. Fat is an important part in nearly every stage of the nutritive process, commencing its work in the digestive apparatus, it continues to occupy the prominent part it has assumed until it is deposited in the cellular tissues, where its mechanical uses are manifes-

3rd. Cell formation is believed to one of its functions, since albumen is known to coagulate around fat globules, a fact that coincides with the origin of the chyle corpuscles perfectly being thus enclosed its probable conversion to hematin, already stated, although not quite satisfactorily demonstrated is in all probability induced. These with the service it renders in assisting in the maintainance of the heat of the body and the numerous purposes it serves while deposited in the cellular structures, capable, at any time, of being brought into more active service, give it a prominence equal to that of albumen.

The inorganic constituents have also their proper sphere indicated by the analogy of chemical composition borne to the several parts, it is not immprobable that there are many chemical changes which it is their proper sphere to produce, as in various transmutations, the requirement of new equivalents is constantly manifest. It is mostly in this way that they aid in nutrition, no one probably in its free state being capable of giving any assistance in that process.

Thus constituted the blood lays sole claim to the title of vital fluid of the organism, it contains every essential to the maintainance of life, which without it is extinct, yet

it is not the life, where there is no circulation there is no life, and without a constancy of those attractive and repulsive forces necessary to this phenomenon, the blood ceases to be a vital fluid. Every atom of the tissue, has an affinity for its particular nourisher, mingled throughout the blood, and that substance falls or gravitates, as the apple to the earth toward that part, What difference therefore exists between this, and that gravitation that governs the universe. None, and this is but an instance of the animal economy and that major work of God, showing their great resemblance.

Nature's laws exhibit a unity of purpose and a correspondence in principle everywhere and man is an epitome of the universe. There is no difference in the forces which propel the vital current, in principle and that which governs the motions of the heavenly bodies, or causes the vaccillation of the needle on its point, or directs its unerring aim. That governing principle which prevades nature and makes the parts of this universe play together in concordant simplicity, within the reach of childish comprehension, we have been pleased to call gravity and it is certainly not

strange that a law so universal should manifest itself in one of the greatest functions of the animal economy. The heart is to the body what the sun is to the solar system: regulating the circulation not producing it or rather not propelling it. The sun is the cause of that change of temperature indicative of the seasons, but attraction and repulsion produce the conditions necessary to a change of season and the sun sends always the same genial, life giving ray; So the heart presides over the flowing tide of life, to regulate its flow and the same force gives motion to the blood, that is, the positive and negative states of the different parts through which it moves, sends it forward from the center or when its store becomes exhausted the nourished parts attract it to the heart. This force is inherent in the nervous system and by whatever name we may call it it, is one with electricity.